

What is Claimed Is:

1. An isolated nucleic acid comprising an isolated avian lysozyme gene expression control region comprising:
- (a) at least one 5' matrix attachment region;
 - (b) an intrinsically curved DNA region;
 - (c) at least one transcription enhancer;
 - (d) a negative regulatory element;
 - (e) at least one hormone responsive element;
 - (f) at least one avian CR1 repeat element; and
 - (g) a proximal lysozyme promoter and signal peptide-encoding region.
2. The isolated nucleic acid of Claim 1, wherein the avian is selected from the group consisting of a chicken, a turkey, a duck, a goose, a quail, a pheasant, a ratite, an ornamental bird or a feral bird.
3. The isolated nucleic acid of Claim 1, wherein the avian is a chicken.
4. The isolated nucleic acid of Claim 1, wherein the lysozyme gene expression control region comprises the nucleic acid sequence in SEQ ID NO: 67, or a degenerate variant thereof.

5. The isolated nucleic acid of Claim 1 comprising a sequence at least 75% identical to SEQ ID NO: 67.

6. The isolated nucleic acid of Claim 1 comprising a sequence at least 95% identical to SEQ ID NO: 67.

7. The isolated nucleic acid of Claim 1 comprising a sequence at least 99% identical to SEQ ID NO: 67.

8. A recombinant DNA molecule comprising an isolated avian lysozyme gene expression control region operably linked to a nucleic acid insert encoding a polypeptide, wherein the lysozyme gene expression control region comprises:

(a) at least one 5' matrix attachment region;

(b) an intrinsically curved DNA region;

(c) at least one transcription enhancer;

(d) a negative regulatory element;

(e) at least one hormone responsive element;

(f) at least one avian CR1 repeat element; and

(g) a proximal lysozyme promoter and signal peptide-encoding region.

9. The recombinant DNA molecule of Claim 8, wherein the avian is selected from the group consisting of a chicken, a turkey, a duck, a goose, a quail, a pheasant, a ratite, an ornamental bird or a feral bird.

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10. The recombinant DNA molecule of Claim 8, wherein the avian is a chicken.

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11. The recombinant DNA molecule of Claim 8, wherein the lysozyme gene expression control region comprises the nucleic acid sequence in SEQ ID NO: 67, or a degenerate variant thereof.

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12. The recombinant DNA molecule of Claim 8, further comprising a polyadenylation signal sequence.

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13. The recombinant DNA molecule of Claim 12, wherein the polyadenylation signal sequence is derived from the SV40 virus.
14. The recombinant DNA molecule of Claim 12, wherein the polyadenylation signal sequence comprises the nucleic acid sequence in SEQ ID NO: 68, or a degenerate variant thereof.

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20 20. The recombinant DNA molecule of Claim 19, wherein the recombinant
DNA molecule is a plasmid.

21. The recombinant DNA molecule of Claim 19, wherein the recombinant DNA molecule is a virus.

5 22. An expression vector that integrates into a host cell and comprising an isolated avian lysozyme gene expression control region operably linked to a nucleic acid insert encoding a polypeptide, wherein the expression control region directs production of a transcript, wherein the lysozyme gene expression control region comprises:

- 10 (a) at least one 5' matrix attachment region;
- (b) an intrinsically curved DNA region;
- (c) at least one transcription enhancer;
- (d) a negative regulatory element;
- (e) at least one hormone responsive element;
- 15 (f) at least one avian CR1 repeat element; and
- (g) a proximal lysozyme promoter and signal peptide-encoding region.

20 23. The expression vector of Claim 22, wherein the avian is selected from the group consisting of a chicken, a turkey, a duck, a goose, a quail, a pheasant, a ratite, an ornamental bird or a feral bird.

24. The expression vector of Claim 22, wherein the avian is a chicken.

5 25. The expression vector of Claim 22, wherein the lysozyme gene expression control region comprises the nucleic acid sequence in SEQ ID NO: 67, or a degenerate variant thereof.

10 26. The expression vector of Claim 22, further comprising a polyadenylation signal sequence.

27. The expression vector of Claim 25, wherein the polyadenylation signal sequence is derived from the SV40 virus.

15 28. The expression vector of Claim 25, wherein the polyadenylation signal sequence comprises the nucleic acid sequence in SEQ ID NO: 68, or a degenerate variant thereof.

20 29. The expression vector of Claim 22, wherein the nucleic acid insert encoding a polypeptide has a codon complement optimized for protein expression in an avian.

30. The expression vector of Claim 22, wherein the nucleic acid insert encodes an interferon $\alpha 2b$ polypeptide.

31. The expression vector of Claim 30, wherein the nucleic acid insert encoding an interferon $\alpha 2b$ polypeptide comprises the sequence in SEQ ID NO: 66, or a degenerate variant thereof.

32. The expression vector of Claim 22 having the nucleotide sequence in SEQ ID NO: 65, or a degenerate variant thereof.

33. The expression vector of Claim 22, wherein the expression vector is selected from the group consisting of a plasmid and a virus.

34. A method of expressing a heterologous polypeptide in a host cell, comprising the steps of:

(a) transfecting a eukaryotic cell with a recombinant DNA molecule as claimed in Claim 5, thereby generating a transfected cell;

(b) culturing the transfected cell in a medium suitable for expression of a heterologous polypeptide under the control of an avian lysozyme gene expression control region encoded by the recombinant DNA molecule.

35. The method of expressing a heterologous polypeptide in a host cell of Claim 34, wherein the eukaryotic cell is derived from an avian.

5 36. The method of expressing a heterologous polypeptide in a host cell of Claim 34, wherein the eukaryotic cell is derived from a chicken.

37. A eukaryotic cell transformed with the expression vector according to Claim 22, or a progeny of the cell, wherein the cell or the progeny thereof
10 expresses a heterologous polypeptide.

38. The eukaryotic cell of Claim 37, wherein the cell is an avian cell.

39. The eukaryotic cell of Claim 37, wherein the cell is a chicken cell.

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40. The eukaryotic cell of Claim 37, wherein the cell is an oviduct cell of a chicken.

41. The eukaryotic cell of Claim 37, wherein the cell is a cultured cell.

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42. The eukaryotic cell of Claim 37, wherein the expression vector has a nucleic acid insert encoding a polypeptide, and wherein the nucleic acid insert has a codon complement optimized for protein expression in an avian.

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43. The eukaryotic cell of Claim 37, wherein the nucleic acid insert encodes an interferon $\alpha 2b$ polypeptide.

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44. The eukaryotic cell of Claim 37, wherein the nucleic acid insert encoding the an interferon $\alpha 2b$ polypeptide comprises the sequence in SEQ ID NO: 66, or a degenerate variant thereof.

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45. A transgenic avian having a heterologous polynucleotide sequence comprising a nucleic acid insert encoding the heterologous polypeptide and operably linked to an avian lysozyme gene expression control region, wherein the lysozyme gene expression control region comprises:

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- (a) at least one 5' matrix attachment region;
- (b) an intrinsically curved DNA region;
- (c) at least one transcription enhancer;
- (d) a negative regulatory element;
- (e) at least one hormone responsive element;

(f) at least one avian CR1 repeat element; and

(g) a proximal lysozyme promoter and signal peptide-encoding region.

5 46. The transgenic avian of Claim 45, wherein the avian is selected from the group consisting of a chicken, a turkey, a duck, a goose, a quail, a pheasant, a ratite, an ornamental bird or a feral bird.

10 47. The transgenic avian of Claim 45, wherein the avian is a chicken.

48. The transgenic avian of Claim 45, wherein the lysozyme gene expression control region comprises the nucleic acid sequence in SEQ ID NO: 67, or a degenerate variant thereof.

15 49. The transgenic avian of Claim 45, wherein the transgenic avian further comprises a polyadenylation signal sequence.

50. The transgenic avian of Claim 49, wherein the polyadenylation signal sequence is derived from the SV40 virus.

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51. The transgenic avian of Claim 49, wherein the polyadenylation signal sequence comprises the nucleic acid sequence in SEQ ID NO: 68, or a degenerate variant thereof.

5 52. The transgenic avian of Claim 45, wherein the nucleic acid insert encoding a polypeptide has a codon complement optimized for protein expression in an avian.

10 53. The transgenic avian of Claim 45, wherein the nucleic acid insert encodes an interferon α 2b polypeptide.

54. The transgenic avian of Claim 45, wherein the nucleic acid insert encoding the an interferon α 2b polypeptide comprises the sequence in SEQ ID NO: 66, or a degenerate variant thereof.

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55. The transgenic avian of Claim 45 having the nucleotide sequence in SEQ ID NO: 65, or a degenerate variant thereof.

20 56. The transgenic avian of Claim 45 wherein the transgenic avian produces the heterologous polypeptide in the serum or an egg white.

57. The transgenic avian of Claim 45 wherein the transgenic avian produces the heterologous polypeptide in an egg white.

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~~58. An isolated nucleic acid having a codon complement optimized for protein expression in an avian.~~

59. The isolated nucleic acid of Claim 58, wherein the avian is a chicken.

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60. The isolated nucleic acid of Claim 59, wherein the nucleic acid insert encodes an interferon $\alpha 2b$ polypeptide.

61. The isolated DNA molecule of Claim 60, wherein the nucleic acid insert encoding the an interferon $\alpha 2b$ polypeptide comprises the sequence in SEQ ID NO: 66, or a degenerate variant thereof.

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